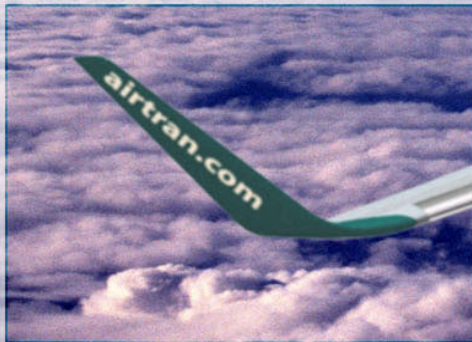


# AirTran<sup>SM</sup>

AIRWAYS



# RCA using REASON

A building block for  
accident/incident investigations

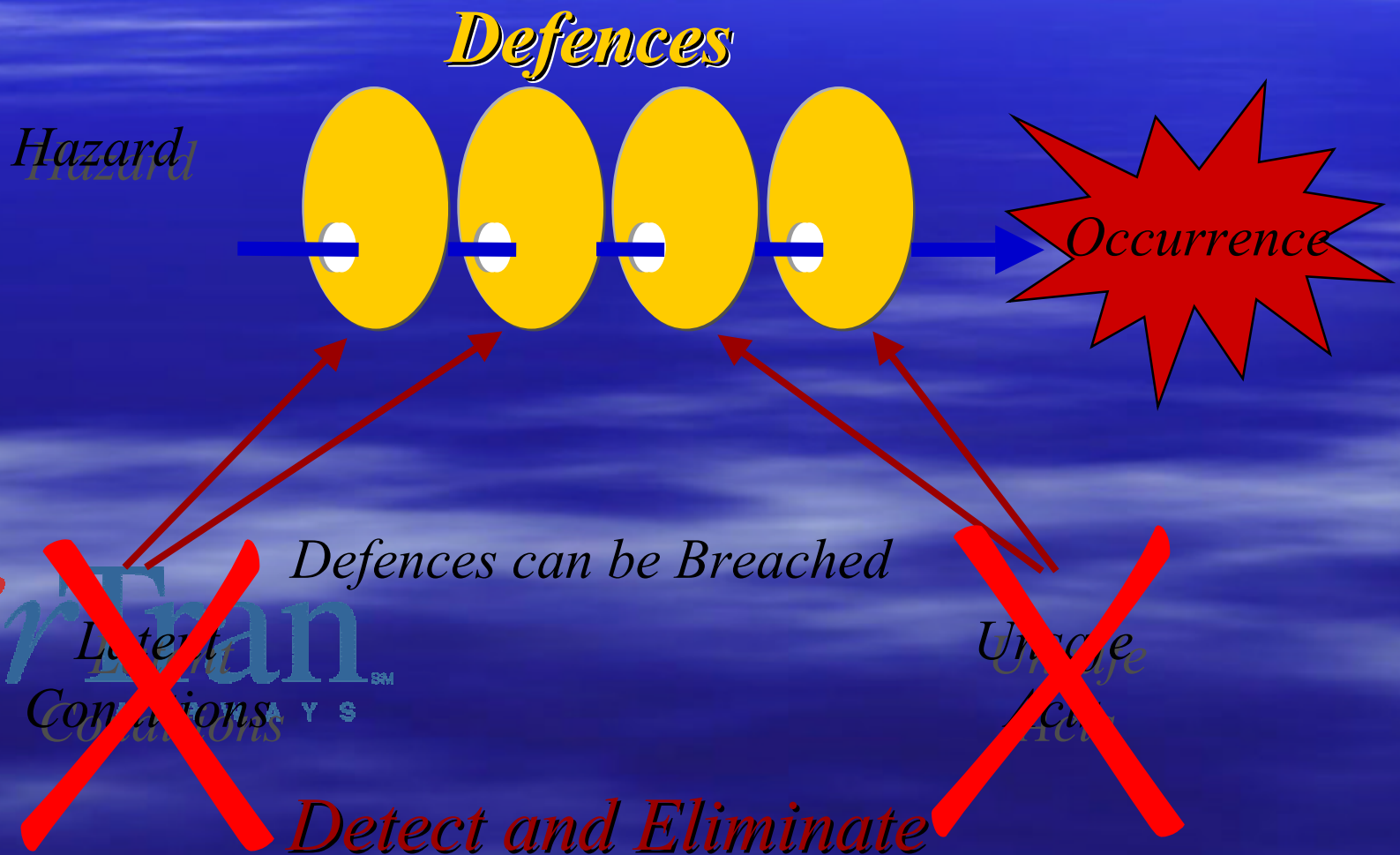




# Contents

- Defense in depth strategy
- Basic Elements
- Building Steps for RCA
- Engineering fixes vs. Organizational fixes
- Root Causes Divisions
- Application of RCA using REASON
- Interpretation of the case
- Interpretation of the summary sheet
- Tendency Toward Process
- Conclusions

# Defense in Depth strategy (James Reason)



# Basic Elements

- A change: An action that triggered another step in the problem.

A/C 123, Flt  
456's left wing  
collided with a  
parked fuel  
truck.

# Basic Element

- A condition: A state of being that existed within the environment over some period of time.



The Pilot's  
scan was poor



# Basic Element

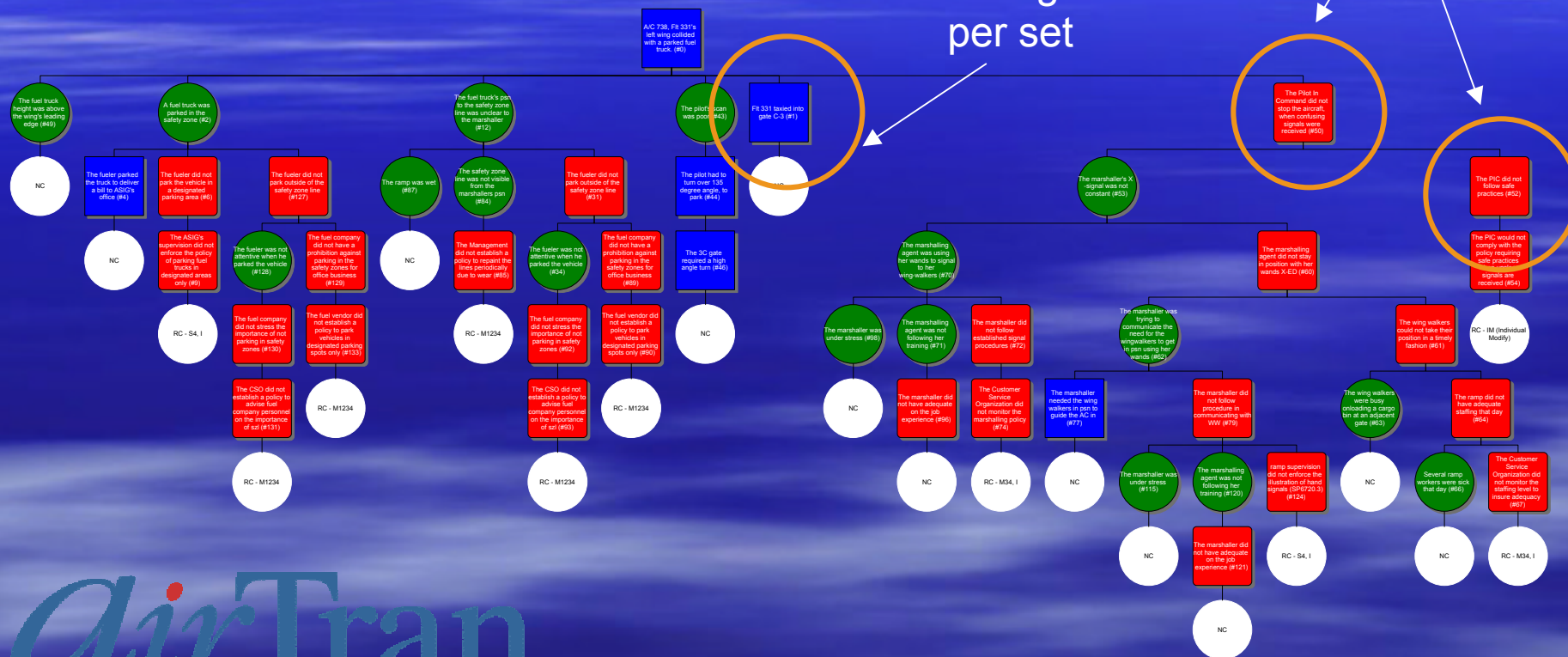
- An Inaction: Anything that could have or should have occurred to prevent the next step in the problem, but did not.

The Pilot In Command did not stop the aircraft, when confusing signals were received

# Set rules

One change per set

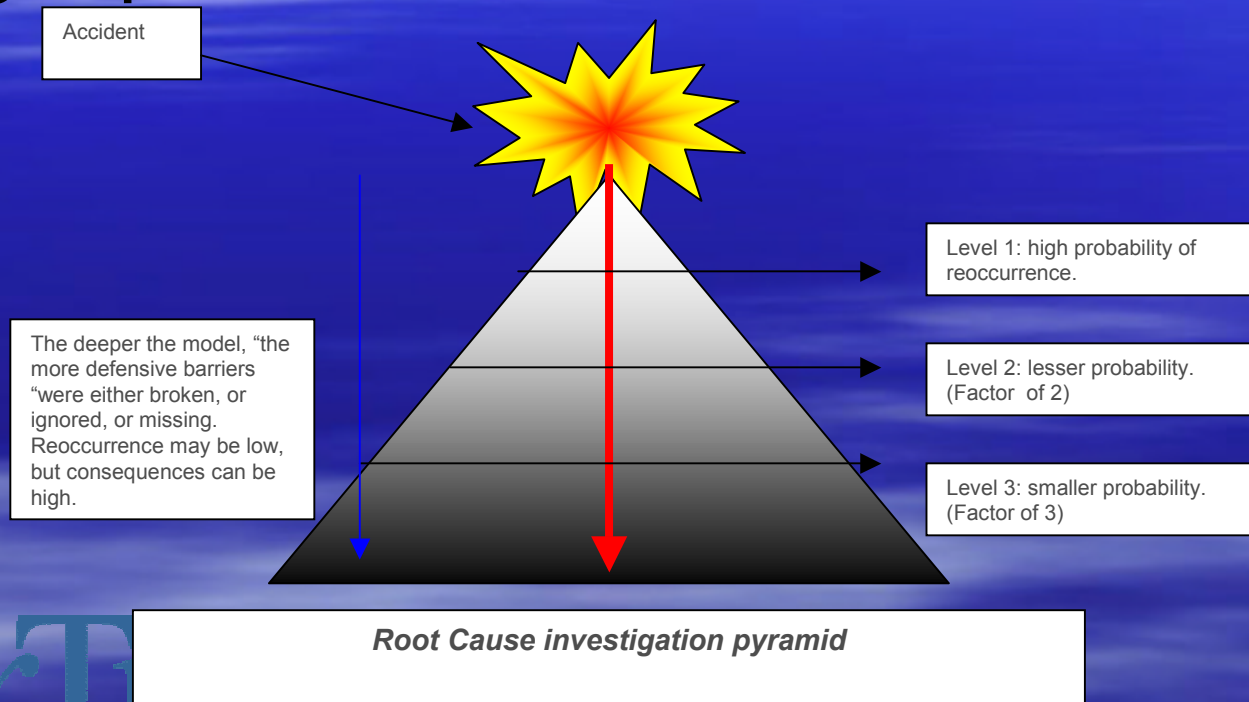
Inaction brought by inaction





# BUILDING STEPS FOR RCA

- Last chain prior to the event chain is on top
- Bigger problem starts at the bottom



# Upstream Analysis

- Critical steps take predominant weight on top of the model, because they provide the last opportunity to avoid a mishap or an accident.



# Downstream Analysis

- Bigger problem (root cause) length of chain of events indicate opportunities to break the chain from unfolding were either ignored or unknown (akin to latent effects).





# Engineering fixes versus organizational fixes

- Engineering fixes are often permanent and can be costly
- They may not be practical
- They can introduce new threats
- They may be disproportionate to the risk itself

# Example

- Boeing 737-400 - G-OBME near Kegworth, Leicestershire on 8 January 1989.
- Airbus A-320, F-GGED: Accident occurred January 20, 1992 by the Mt. St. Odile (Lower Rhine).

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# Root Causes division

- Management Level Action Required
- Management:
  - ...Did not ESTABLISH a policy...
  - ...Did not DESIGNATE that this policy apply to this...
  - ...Did not COMMUNICATE..
  - ... Did not Establish a means to MONITOR compliance
  - ...Did not COMMUNICATE how they were MONITORING...
  - ...Did not ENFORCE the policy when infraction was found.



# Supervision Level

- Supervision did not:
  - COMMUNICATE what was wanted
  - PROVIDE the things necessary to comply
  - FOLLOW the policy in the past
  - ENFORCE the policy in the past

# Individual Action Level

- The individual's:
  - Incorrect action is acceptable and the policy can be changed.
  - Incorrect behavior can be MODIFIED.
  - Incorrect behavior cannot be changed, and he must be REMOVED from that particular environment.

# NOTE

- “Selecting an individual Root Cause is a **serious** and **rare** decision. Using the RC wizard will help to avoid missing the systemic portion of a Root Cause where the individual(s) share responsibility.”



# Application of RCA using REASON's

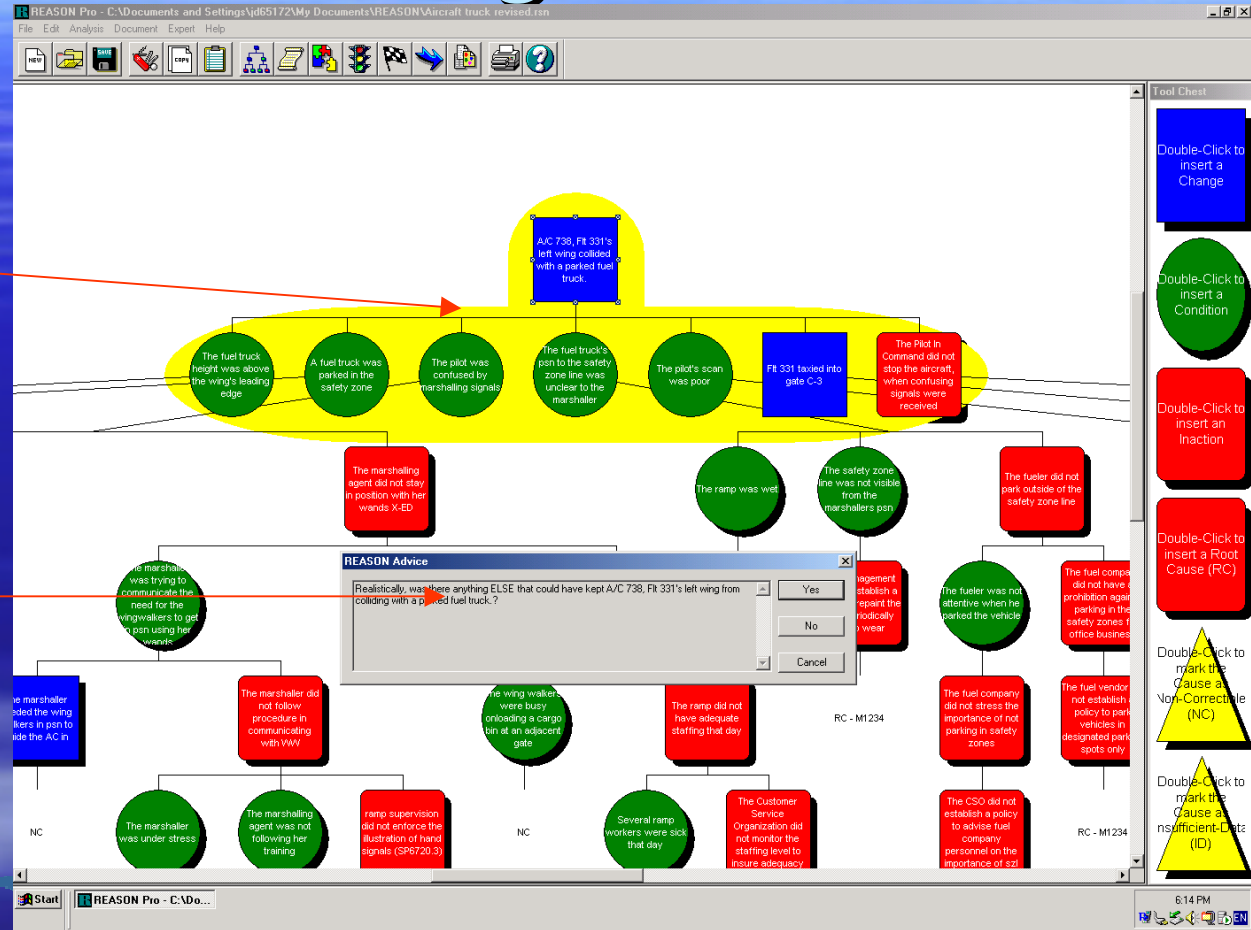
- Problem Statement:
  - Aircraft 123 arrived at destination as flt 456 from Philadelphia on 06/14 with 59 customers. Gate assigned was C-3. As the airplane moved towards the gate it struck a fuel truck.

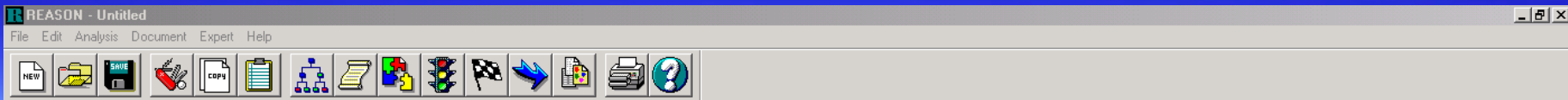


# Facilitation/Logic Test

Highlights focus area to investigate

Facilitates reasoning, by asking relevant questions





# Level : Full Investigation (REASON Pro)

Selecting any of the criteria listed will trigger a full investigation

**Case Assessment**

Criteria for: REASON Pro

- 1: Property damage greater than \$25,000
- 2: Personal injury to include lost time injury, permanent disability, or loss of life
- 3: Significant mission impact due to USA-delivered products and/or actions or inactions of USA or subcontractor employees
- 4: All category 1 and 2 audits findings documented by third party ISO quality system auditors
- 5: All internal audit findings that are either systemic in nature or have risk assessment scores of 15 to 25 as determined by the SFDC O
- 6: Process escapes that are required to be reported at the Program Manager level or above
- 7: Close calls with a risk assessment score of 15 to 25 as determined by the SFDC Operations Risk Assessment Scorecard

Select all statements from above that are true.

< Previous      Next >      Exit



# Level: Express Investigation (REASON Express)

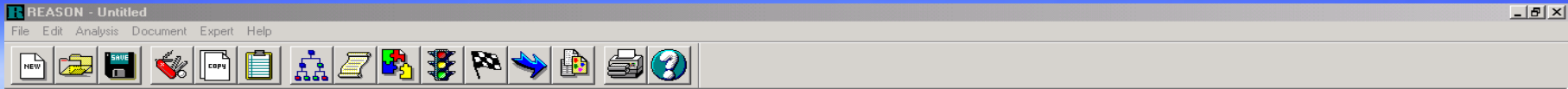
**Case Assessment**

Criteria for: REASON Express

- 1: This problem produced an injury or exposure requiring hospitalization or extended doctor care
- 2: This problem caused a temporary interruption of operations
- 3: This problem caused damage to facility/equipment that will impact scheduling, deadlines, delivery, etc.
- 4: There is a known history of similar events (without regard to actual losses)

Select all statements from above that are true.

<Previous      Next>      Exit



# Level: Front Line Investigations

**Case Assessment**

Criteria for: REASON Front Line

- 1: This problem required a first aid visit and documentation, but did not require repeat doctor's care
- 2: This problem a minor compliance/procedure issue requiring documentation
- 3: This problem is a minor issue that needs attention, and that will improve operations safety/quality

Select all statements from above that are true.

<-Previous      Next->      Exit

Ready

Start      Microsoft PowerPoint - [IS...      REASON - Untitled

6:32 PM  
EN

# Interpretation

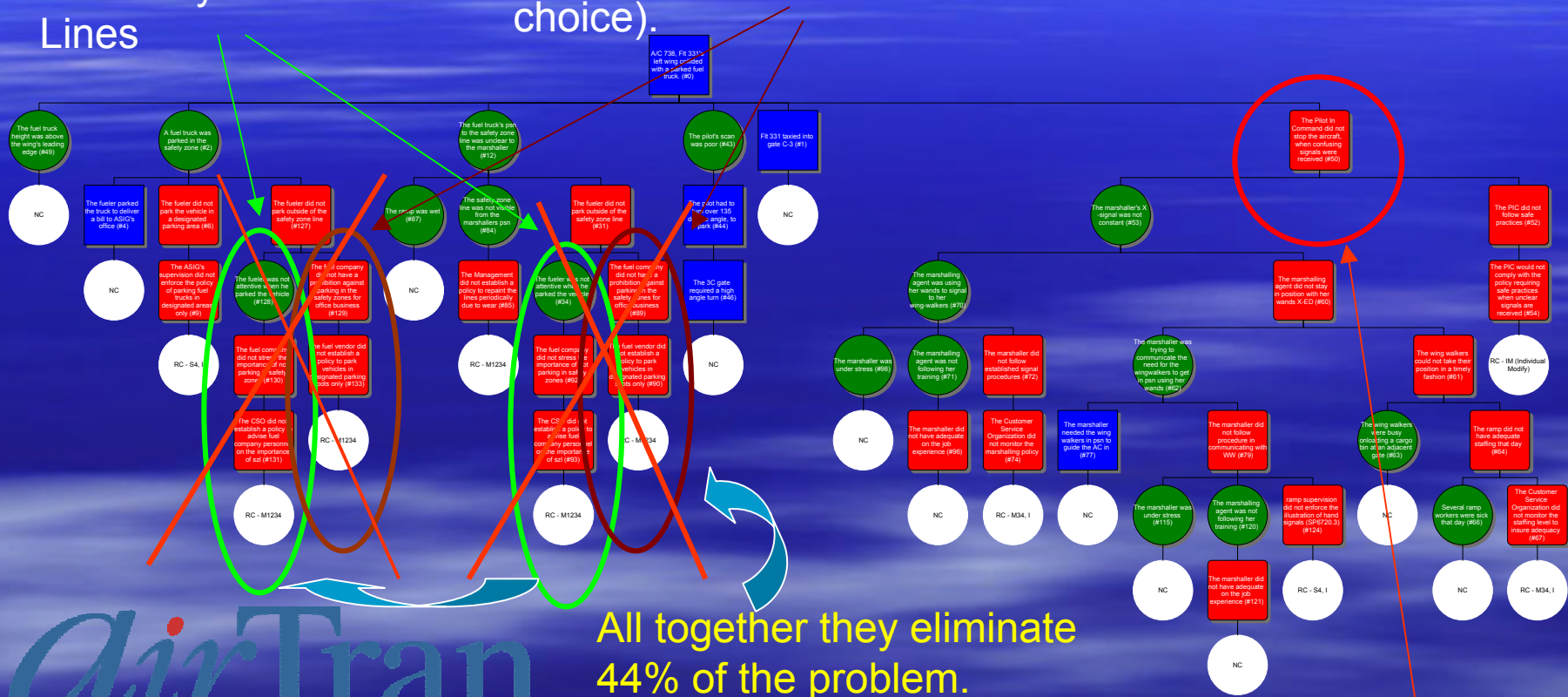
- The CSO has an opportunity to establish a policy to advise fuel company on SZL. [Best option-22%]
- The Fuel vendor has an opportunity to establish a policy to park vehicles in designated spots. [2nd best-22%]
- The CSO has an opportunity to monitor staffing level, and insure they comply with business processes.[3<sup>rd</sup> best-15%]
- The Ramp Supervision can enforce hand signals. [4<sup>th</sup> best-14%]
- The CSO can monitor marshalling policy. [5<sup>th</sup> best-13%]
- The PIC has an opportunity to stop (if unclear signals are received. [6<sup>th</sup> best-12%]
- Fuel vendor can enforce parking in designated areas. [7<sup>th</sup> best-9%]
- Management can establish policy to repaint lines periodically. [8<sup>th</sup> best-7%]



22% of the model is eliminated by advising fuel vendor on Safety Zone Lines

# Interpretation

Parking vehicles in designated areas eliminates 22% as well (2<sup>nd</sup> best choice).



All together they eliminate 44% of the problem.

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The pilot (last line of defense) is only the 6<sup>th</sup> best choice, by then several barriers have failed

# Interpretation of the summary sheet

## REASON® Summary Sheet

The Model is:	Closed
Quantification Reliability:	100.0%
Total Relative Causal Stress:	29.3690
Total Proper Causal Stress:	79
Causal Stress TTP:	3.7176
Total Relative Generating Causality:	22.4190
Total Proper Generating Causality:	64
Generating Causality TTP:	3.5030

Raw value of # Changes, Inactions and Conditions.

Same as above but weighted according to the level where it is

Raw value of # Changes, and Inactions.

# Interpretation

- The model is reliable: 100%
- The raw number of changes in actions and conditions is :79
- The weighted number is 29, which means things happen close to the accident
- The TTP tendency toward process indicates how quickly the event is likely to re-occur.



# Relative vs Proper

- More weight is attributed to the top of the model.
- Proper means an equal number regardless of the level at which the events occur.

# Causal vs Generating

- Causal is the number weighted changes, inactions and conditions.
- Generating is the number of weighted changes and inactions.

# Conclusion

- The Root Cause approach offers an additional facet to accident investigations.
- It offers a systemic approach in particular focuses on the organizational latent effects.
- It affords a framework for RCA investigations.
- It may pre-empt “removing the cause” and the problem ceases to exist.